

Error Bars and Data Fitting

Spoken Tutorial Project

<https://spoken-tutorial.org>

National Mission on Education through ICT

<http://sakshat.ac.in>

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Learning Objectives



Learning Objectives

- ▶ Learn to add error bars in a plot



Learning Objectives

- ▶ **Learn to add error bars in a plot**
- ▶ **Learn about data fitting**



Learning Objectives

- ▶ Learn to add error bars in a plot
- ▶ Learn about data fitting
- ▶ Write an equation to fit the data



Learning Objectives

- ▶ Learn to add error bars in a plot
- ▶ Learn about data fitting
- ▶ Write an equation to fit the data
- ▶ Make initial guess for value of the coefficients



Learning Objectives



Learning Objectives

- Fit the dataset to the equation



Learning Objectives

- ▶ **Fit the dataset to the equation**
- ▶ **Draw an arrow object in the graph**



System Requirements



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► **Ubuntu Linux 16.04 OS**



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- ▶ `gnuplot v 5.2.6`



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- ▶ `gnuplot v 5.2.6`
- ▶ **Gedit v 3.18**



Pre-requisites



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- ▶ **Learner must be familiar with the basics of gnuplot**



Pre-requisites

- ▶ **Learner must be familiar with the basics of gnuplot**
- ▶ **For the prerequisite tutorials please visit this site**

<https://spoken-tutorial.org>



Code Files



Code Files

- The files used in this tutorial are provided in the Code files link



Code Files

- ▶ **The files used in this tutorial are provided in the Code files link**
- ▶ **Please download and extract the files**



Steps for Fitting the Data



Steps for Fitting the Data

- ▶ **Define an equation to represent the data**



Steps for Fitting the Data

- ▶ **Define an equation to represent the data**
- ▶ **Make initial guess values for the coefficients in the equation**



Steps for Fitting the Data

- ▶ Define an equation to represent the data
- ▶ Make initial guess values for the coefficients in the equation
- ▶ Optimal values for the coefficients are found by an iterative process



Steps for Fitting the Data



Steps for Fitting the Data

- ▶ Check the goodness of the fit



Steps for Fitting the Data

- ▶ Check the goodness of the fit
- ▶ A good fitting is measured by a low value of χ^2



Steps for Fitting the Data

- ▶ Check the goodness of the fit
- ▶ A good fitting is measured by a low value of χ^2
- ▶ Display the fitted data with the starting dataset



Summary



Summary

- ▶ Incorporated error bars in a plot
- ▶ Fitted a given set of data points to an equation
- ▶ Plotted the fitted curve along with parent data
- ▶ Added and removed an arrow object



Assignment



Assignment

- ▶ For the data file **assignment.txt**, make an xy graph with xyerrorbars
- ▶ This file is available in the Code files link



Assignment



Assignment

- ▶ **Fit the data to a double exponential decay curve with error bars**
- ▶ **Plot the fitted data**
- ▶ **Draw an arrow object in the graph at the position of your choice**



About the Spoken Tutorial Project

- ▶ Watch the video available at https://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- ▶ It summarises the Spoken Tutorial project
- ▶ If you do not have good bandwidth, you can download and watch it



Spoken Tutorial Workshops

The Spoken Tutorial Project Team

- ▶ Conducts workshops using spoken tutorials
- ▶ Gives certificates to those who pass an online test
- ▶ For more details, please write to contact@spoken-tutorial.org



Forum for Specific Questions

- ▶ Questions in **THIS Spoken Tutorial?**
- ▶ Visit <https://forums.spoken-tutorial.org>
- ▶ Choose the minute and second where you have the question
- ▶ Explain your question briefly
- ▶ The Spoken Tutorial project will ensure an answer

You will have to register to ask questions



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